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CGP/P0077

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0315571.0

03JUL03 FR19845-1 010000  
P01/7700 0.00-0315571.0

CATALYST DEVELOPMENTS LIMITED  
48 UPHILL GROVE  
LONDON  
NW7 4NJ  
UK

Patents ADP number (if you know it)

8660698001

If the applicant is a corporate body, give the country/state of its corporation

4 Title of the invention

CHILD SAFETY SEAT

5 Name of your agent (if you have one)

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

DR CHRISTOPHER GERARD PIKE  
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7497928002

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Country

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Date of Filing  
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Number of earlier application

Date of filing  
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Description 14

Claim(s)

Abstract

Drawing(s) 9 + 9 *See*

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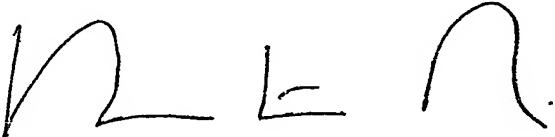
Request for preliminary examination  
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11.

I/We request the grant of a patent on the basis of this application



Signature Christopher Gerard Pike  
AGENT FOR THE APPLICANTS

02 July 2003

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12. Name and daytime telephone number of  
person to contact in the United Kingdom

Dr. Christopher G. Pike  
01628 471869

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### Child safety seat

#### Technical Field

The present invention relates to a safety seat for a child of the kind that is securable to the seat of a vehicle. In particular, the present invention relates to a child safety seat that is readily manoeuvrable to enable ready placement of the child in the secured seat and subsequent removal there from.

#### Background to the Invention

Child safety seats for use with vehicles are well known in the prior art. Such seats are typically designed to be mountable to the front or rear seat of a vehicle and to provide a safe and secure carriage environment for the child. At minimum, the seat enables the child to be securely fastened to the seat such that in the event of an emergency stop or vehicle accident the child remains securely in the safety seat, which itself remains securely mounted to the vehicle seat.

It is desirable that the child safety seat is configured to allow movement of the seat from an upright seated position to one or more reclined positions, thereby enabling accommodation of the child in both 'alert and awake' and 'tired and sleepy' states.

It is also desirable that the child safety seat enables ready and convenient placement and removal of the child therein. The Applicants have now found that it is advantageous if the child safety seat is mountable to the vehicle seat such that it

may be reversibly rotated towards an open vehicle door. To place the child in the seat, the vehicle door is thus opened and the child seat rotated by typically about 90° towards the vehicle door to a 'loading configuration' in which the seat faces the open door. The child is then securely stowed in the child safety seat, which is then rotated back to its normal 'travel configuration', in which the child seat generally faces the direction of travel of the vehicle.

A problem is encountered in providing a child safety seat that is securable to the vehicle seat such that it is both reclinable and rotatable relative thereto. The problem arises not only because the two desired movements can potentially conflict in a mechanical sense but also because the child seat must provide such flexibility of movement whilst not comprising its safety function, which requires both secure mounting to the vehicle seat and safe containment of the child. The child safety seat must be robust enough to withstand impact in the event of a collision and the daily wear and tear associated with regular use by an energetic child.

Further problems can arise in providing such flexibility of movement within a child safety seat design that provides simplicity of operation for the parent who faces the challenge of interacting with the seat whilst also struggling with a wriggling and occasionally, grumpy child. One-handed operation of the seat is preferable, the other hand therefore remaining available for the holding of the child.

It is an object of the present invention to provide a child safety seat that is both rotatable and reclinable relative to a vehicle seat to which it is securely mountable.

It is another object of the present invention to provide such a child safety seat that provides both simplicity of operation for the parental user and comfort and safety for the child.

### Summary of the Invention

According to a first aspect of the present invention there is provided a child safety seat for use with a vehicle seat comprising

a base arranged for secure fitting to said vehicle seat;

a child seat arranged for secure placement of a child therein; and

a mounting for mounting said child seat to said base,

wherein said mounting provides for both reversible lateral movement of the child seat relative to the base from an initial position to one or more reclined positions and reversible rotational movement of the child seat relative to the base to a loading position, which enables ease of placement of a child in the child seat.

The invention provides a child safety seat for use with a vehicle seat. The child safety seat is designed to provide a safe and secure carriage environment for the child. In particular, the child safety seat is designed such that in the event of an emergency stop or vehicle accident the child remains safe and secure in the safety seat, which itself remains securely mounted to the vehicle seat.

The child safety seat comprises a base that is arranged for secure fitting to a vehicle seat. The vehicle may for example, be a car, van, lorry, bus or coach but is most usually a car. The vehicle seat may be either a front or rear seat and has known seat form. The base of the child seat is itself sized and shaped to marry up, or at least to be readily receivable by the vehicle seat. Secure fitting of the base to the vehicle seat is by any suitable secure fitting means, which may be provided to the vehicle seat or base or more typically, to both. Such secure fitting means may comprise any suitable belts and fastening means including buckles and snap-fit fastenings such as ISOFIT (trade name) or L.I.F.T. (trade name) fastenings.

Whilst it is desirable that the base is readily securable to the vehicle seat, ease of fitting and removal is less important than the security of fitting to the vehicle seat. In a typical usage mode the base is securely fitted to the vehicle seat and remains so fitted during the lifetime of use of the child seat product rather than being fitted and removed regularly.

The base is also arranged for receipt of the mounting and child seat described in more detail hereinafter. In one aspect, the base is provided with a furrow or basin therein (e.g. cut-away form) sized and shaped for ready receipt of the seat base.

The child seat also comprises a child seat that is arranged for secure placement of a child therein. The shape and form of the child seat is generally conventional and typically comprises a seat base for support of the child's bottom and thighs and a seat back for support of the child's back. Wings are suitably provided to the seat base and seat back, the former functioning as arm rests for the child and the latter functioning to reduce freedom of child head / shoulder movement but principally to provide additional protective function (e.g. for the child's head) in the event of (e.g. a side impact) vehicle collision.

There is also provided a mounting for mounting the child seat to the base. In one aspect, the mounting readily enables reversible mounting / demounting of the child seat from the base, although this is not always required.

As background, it is noted that child safety seats are generally of two types. The first type is often referred to in the industry as a 'first stage' seat and is designed for safe carriage of a child of up to about nine months with a weight of less than 9kg. The usage mode for such 'first stage' seats is typically that the child seat functions as both a safety seat and a 'carry cot' with the child remaining stowed therein as the child seat is placed in and removed from the vehicle. A 'first stage' child seat must thus, be reversibly removable from the base (which remains fitted to the vehicle).

The second type is often referred to in the industry as a 'second stage' seat and is designed for safe carriage of a child from about nine months to four year with a weight of from about 9kg to 18kg. The usage mode for such 'second stage' seats is typically that the child seat functions just as a vehicle safety seat and remains in the vehicle with the child being placed in and removed from the seat which remains *in situ* in the vehicle. A 'second stage' child seat need not thus, be reversibly removable from the base (which remains fitted to the vehicle).

The child safety seat described herein is preferably, a 'second stage' seat. The problems it addresses are more applicable to the older, larger, more active 'second stage' child than to those encountered for seat designed for younger children.

In accord with the present invention, the mounting provides for both reversible lateral movement of the child seat relative to the base from an initial position to one or more reclined positions and reversible rotational movement of the child seat relative to the base to a loading position, which enables ease of placement of a child in the child seat. The reversible lateral and rotational movement are preferably independent of each other (i.e. each may be enabled independent of the other).

The reversible lateral movement of the child seat relative to the base is from an initial, generally child-sitting position to one or more (e.g. from one to six) reclined positions. Thus, the lateral movement is typically a backwards-forwards movement relative to a normal sitting direction as would be defined by the configuration of the child seat, and is generally either a 'child faces forward to direction defined by vehicle seat' or less typically, but not inconceivably, 'child faces backward to direction defined by vehicle seat'. Typically, the base remains static relative to the seat, to which it is securely fitted and the child seat moves relative thereto both the base and vehicle seat.

The reversible rotational movement of the child seat relative to the base is from a first position, in which the child seat is non-rotated (i.e. 0° rotation) relative to the

normal sitting direction to a loading position, in which the child seat is rotated (i.e. > 0° rotation) to a position that enables ease of placement of a child in the child seat. The rotation may be in a clockwise or anti-clockwise sense so that the vehicle seat may be rotated to either vehicle door opening. Suitably, in the loading position the child seat is rotated such that it faces, or nearly does so, the vehicle door thereby, corresponding to a 90° rotation relative to the normal sitting direction. In one aspect, the maximum degree of rotation corresponds to a 90° rotation relative to the normal sitting direction. Suitably, the bottom part of the seat (i.e. the seat pan) also remains in close relationship to the base (e.g. in a horizontal configuration, in use) during rotation thereof.

The Applicants have noticed that for a standard configuration of child seat rotational movement of the child seat can be more straightforward when the child seat is in the non-reclined (i.e. initial position). In one preferred aspect therefore, the mounting provides for both reversible lateral movement of the child seat relative to the base from an initial position to one or more reclined positions and reversible rotational movement of the child seat relative to the base from said initial position to a loading position, which enables ease of placement of a child in the child seat.

Alternatively, the Applicants have noticed that for a standard configuration of child seat rotational movement of the child seat is more straightforward when the child seat is spaced (e.g. lifted upwards) from the base relative to its normal usage positioning. In another preferred aspect therefore, the mounting provides for each of reversible lateral movement of the child seat relative to the base from an initial position to one or more reclined positions; reversible spacing movement of the child seat relative to the base from said initial position to a spaced position; and reversible, rotational movement of the child seat relative to the base from said spaced position to a loading position, which enables ease of placement of a child in the child seat.

It will be appreciated that the child safety seat herein is designed for use in essentially two modes, namely a 'travel mode' in which the child is secured in the

child seat and a 'loading / unloading' mode in which the child is being placed into / removed from the child seat. In general terms, in the 'travel mode' the enabling of lateral movement of the child seat relative to the base is desirable whereas rotational movement thereof is either not desirable or entirely undesirable. Again in general terms, in the 'loading / unloading mode' the enabling of lateral movement of the child seat relative to the base is either not very desirable or entirely undesirable whereas rotational movement thereof is desirable.

It will also be appreciated that whilst user (i.e. parent or guardian) controlled lateral, rotational or in aspects, spacing movement of the child seat relative to the base is desirable as described herein, in the travel mode, particularly when the vehicle is moving it is essential that the child safety seat does not uncontrollably move about. Reversible locking and / or control mechanisms are therefore typically provided to control the various movements such that movement is enabled when desired but otherwise the child seat is locked in a particular position / configuration, which may be an intermediate position / configuration. Locking is certainly desirable during travel (i.e. when the vehicle is moving). Such locks and /or controls may therefore comprise lateral movement lock and / or control mechanisms, rotational movement lock and / or control mechanisms and in aspects, spacing movement lock and / or control mechanisms.

Preferably, the child safety seat is configured such that in the 'travel mode' in respect of the mounting, the lateral movement is locked into either the initial position or / any reclined position; the rotational movement is locked into the non-rotated (i.e. 0° rotation) position; and any spacing movement is locked into the non-spaced position.

It will be appreciated that the base, child seat and mounting for the child safety seat herein may be manufactured and supplied separately and /or supplied as a kit of parts. The present invention encompasses all of these separate component parts.

According to another aspect of the present invention there is provided a child seat for use with the child safety seat herein.

In particular, there is provided a child seat for use with a base arranged for secure fitting to a vehicle seat to form a child safety seat for use in a vehicle, the child seat comprising

a child seat arranged for secure placement of a child therein; and

a mounting for mounting said child seat to said base,

wherein said mounting provides for both reversible lateral movement of the child seat relative to the base from an initial position to one or more reclined positions and reversible rotational movement of the child seat relative to the base to a loading position, which enables ease of placement of a child in the child seat.

According to another aspect of the present invention there is provided a base for use with the child safety seat herein.

In particular, there is provided a base for use with a child seat arranged for secure placement of a child therein to form a child safety seat for use in a vehicle, the base comprising

a base arranged for secure fitting to a vehicle seat; and

a mounting for mounting said base to said child seat,

wherein said mounting provides for both reversible lateral movement of the child seat relative to the base from an initial position to one or more reclined positions and reversible rotational movement of the child seat relative to the base to a loading position, which enables ease of placement of a child in the child seat.

According to another aspect of the present invention there is provided a mounting for use with the child safety seat herein.

In particular, there is provided a mounting for use in a child safety seat comprising a base arranged for secure fitting to a vehicle seat and a child seat arranged for secure placement of a child therein, said mounting comprising

a mounting for mounting said child seat to said base,

wherein said mounting provides for both reversible lateral movement of the child seat relative to the base from an initial position to one or more reclined positions and reversible rotational movement of the child seat relative to the base to a loading position, which enables ease of placement of a child in the child seat.

#### Brief Description of the Drawings

The invention will now be described further with reference to the accompanying drawings, in which:-

Figure 1 shows all modules of a base part of a first child safety seat in accord with one aspect of the present invention in general arrangement;

Figure 2 shows all modules of a first child safety seat in accord with one aspect of the present invention in general arrangement;

Figure 3 shows all modules of a first child safety seat in accord with one aspect of the present invention in exploded view;

Figures 4a to 4c show views of Modules A to C respectively of the first child safety seat of Figure 2;

Figure 8 shows a perspective view of a child safety seat in accord with one aspect of the present invention;

Figure 9 shows a perspective view of a sub-assembly minus the child seat part of the child safety seat of Figure 8;

Figure 10 shows a perspective, exploded view of the child safety seat of Figure 8;

Figure 11 shows a perspective view of a first part of the sub-assembly of Figure 9;

Figure 12 shows a perspective view of a second part of the sub-assembly of Figure 9;

Figure 13 shows a perspective view of a third part of the sub-assembly of Figure 9;

Turning now to Figures 8 and 10, which show a safety seat in perspective and exploded views, the child safety seat may be seen to comprise a seat 204 and a base 229. The seat 204 has a seat base 270 for receiving the child's bottom and thighs, a seat back 272 and lower 274a, 274b and upper 275a, 275b pairs of wings, which provide protection in the case of vehicle accident. The seat 204 is also provided with buckles 293, 294 for securing a child in the seat.

With particular reference to Figure 10, the child safety seat may be seen to comprise four main components: seat 204; recline module 219; base 229 and rotational plinth 230. Figure 9 shows a sub-assembly of the latter three components and Figures 11 to 13 respectively show details of the recline module 219; base 229 and rotational plinth 230 in greater detail.

It will be appreciated from the description hereinafter, that the recline module 219 has three main functions: to act as a mounting for the seat 204; to allow secure and steady reclining of the seat 204; and to act as one half of a rotating joint which allows itself and the seat 204 attached to it to rotate as a single entity about a generally vertical axis.

Recline module 219 attaches to seat 204 unit by way of a slider mechanism comprising dual sets 220a (not visible), 220b and 223a, 223b (not visible) of runners located on arms 221a, 221b of the module 219. The second set of runners 223a is provided with plural notches 224a, 224b, 224c each notch corresponding to a defined position of recline. It will be appreciated that each set of runners 220b, 223a receives pins (not visible) located on the underside of the seat 204 and therefore that this arrangement enables movement of the seat 204 relative to the recline module 219 and base 229 to various defined recline positions.

The recline module 219 couples permanently to base 229 at two main points of coupling. Firstly, central spindle 202 protrudes from rotational plinth 230 and feeds through hole 205 in the base 229 and a similar hole in recline module 219 (not visible) where a capping bolt (again not visible) is applied. The capping bolt is applied in such a way that recline module 219 is rotatable about the base 229 and rotational plinth 230. Secondly, curved slide rail 278 is retainably received by curved track 283 located on the inner part of the back 273 of the base 229. In use, these two points of joining maintain the recline module 219, base 229 and rotational plinth as a defined sub-assembly (i.e. as shown in Figure 9). In particular, receipt of the curved slide rail 278 by the curved track 283 is arranged such that a degree of coupling is retained by this join even when the recline module 219 is rotated by 90° relative to the base 229 and rotational plinth 230.

Operation of the rotational mechanism as described is by handle 260, which is pulled outwards to release a locking pin (not visible) which protrudes from the recline



module 219 into the base 229 and the release of which allows the recline module to rotate relative thereto. The handle and locking pin are spring-loaded such that the spring (not visible) returns the handle 260 and locking pin when the handle 260 is released. The locking pin may therefore be used to lock the recline module in either the forward facing or 90° clockwise or anti-clockwise rotated positions.

As will be appreciated from the description herein, the base 229 has three main functions: to act as the main anchor point for the whole unit to the vehicle seat; to define the angle of the backrest part of the seat 204 when received in the vehicle seat to create a suitable geometry for the rotation function to operate successfully; and to act as the second half of a rotating junction providing an area for the recline module 219 and seat 204 to rotate.

In use, the base is securely fitted to a vehicle seat by use of a two point seat belt fixing system at fixing points 297a, 297b and 298a, 298b. Metal locking plate 291 for the previously described rotation locking pin (not visible) is set in to a circular recess 280 provided to the inner part of the base 229.

The principal function of the rotational plinth 230, which sits on the vehicle seat and receives the other parts of the child safety seat, is to act as a platform which defines the angle of the seat 204 relative to the vehicle seat to create a suitable geometry for the rotation function to operate successfully. It also provides central spindle 202 which defines the axis of rotation for the recline module 219 and seat 204. The plinth 230 is also provided with nylon bearing 287, which defines a track, about which the base 299 of recline module 219 can run freely. Additionally, internal webbing is present as on all mouldings to add strength.

It will be appreciated that the arrangement of the third child safety seat of Figures 9 to 13 advantageously enables the seat 204 to be rotated in either direction (i.e. clockwise or anticlockwise) whilst in either the fully upright or any recline position.

The general arrangement for this design shows the main features in conjunction with each other.

#### HOW IT WORKS:- key points

- 1) It creates the required geometry for vertical rotation of the chair attached above it, by sitting on the angled automobile seat and 'filling' the undesired space to give a horizontal and vertical level at 90° to each other.
- 2) It allows rotation to either side (left / right) by a full 90°.
- 3) It allows reclining of the seat in any position, e.g. facing forwards or sideways.
- 4) It maintains a vertical level even when rotated, so the seat is never angled sideways, even when rotated to the side and/or reclined.
- 5) It maintains full structural integrity at ALL times, and no part of the fixings either between the product and the car, or between the separate modules of the product ever becomes detached or released.

#### THE DIFFERENT MODULES OF THE DESIGN, SERVE THESE FUNCTIONS.

##### MODULE 'A'

Module 'A' has 3 main functions.

- 1) To act as a mount for the existing seat unit.
- 2) To allow reclining action from two points of intersection giving a secure & steady recline.
- 3) To act as one half of a rotating joint, allowing it's self, and the seat unit attached to it to rotate as a single entity through a vertical axis.

##### RELATIONSHIP OF 'A' TO THE OTHER PARTS.

Module 'A' is attached to existing seat unit using the standard slot mechanism (fig a1) at the base to lock position of recline, and similar slot fixing (fig a2) at the top which allows movement along a set path as on current available chairs, such as maxi-cosi priory seat.

Module 'A' is attached at all times to Module 'B' by 2 main points of contact. There is a central bolt running through the centre of an oversized joining area (fig a3) and at the rear by a sliding joint with a male/female extrusion. The male part is on Module 'A' (fig a3) whilst the female part is on Module 'B'. These extrusions maintain the point of contact between Module 'A' & 'B' at ALL times, as they are designed to pass each other through 110° meaning even when rotated by 90° the 2 parts remain joined.

Module 'A' is also in contact with Module 'C' at 'A's lowest point (fig a5). This area sits on the nylon bearing located within Module 'C' The handle to operate the rotating mechanism is positioned on the front of Module 'A' (fig a6) and is actuated by pulling out from the product, releasing the

locking pin (fig a7) and allowing the whole module to rotate. The spring (fig a6) returns the handle & locking pin when released, and would lock the rotation in either the forward facing or one of the 90° positions.

## MODULE 'B'

### Module 'B' has 3 main functions

- 1) To act as the main anchor point for the whole unit, using an existing 2 point seat belt fixing system such as that in the maxi-cosi priory (fig b1).
- 2) To 'rectify' the angle of the backrest part of the seat in the automobile, to create a suitable geometry for the rotation function to operate successfully (fig b2).
- 3) To act as the second half of a rotating junction providing an area for the upper modules to rotate (fig b3) and to provide support & a point of attachment to Module 'A', by use of a sliding joint with a male/female extrusion. The female part is on Module 'B' (fig b4)

The metal locking plate for the rotation locking pin is set in to the top surface of module 'B' (fig b5). The lowest point of Module 'B' (fig b6) will be in contact with the inner base of Module 'C' to provide further strength.

## MODULE 'C'

Module 'C' is the base unit. It's main function is to 'rectify' the angle (fig c1) of the seat unit in the automobile, to create suitable geometry for the rotation function to operate successfully. It also bolts through Module 'B' to join on to Module 'A' and provides the central pivot point (fig c2) and houses a Nylon bearing for Module 'A' to run freely on (fig c3). Internal webbing is present as on all the mouldings to add strength (fig c4).

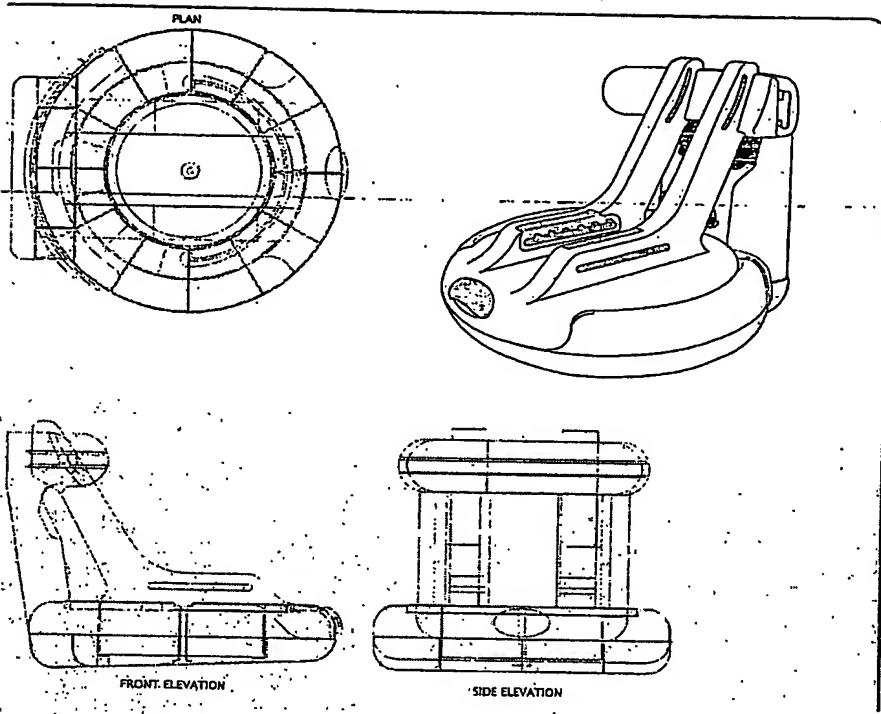


Fig 1

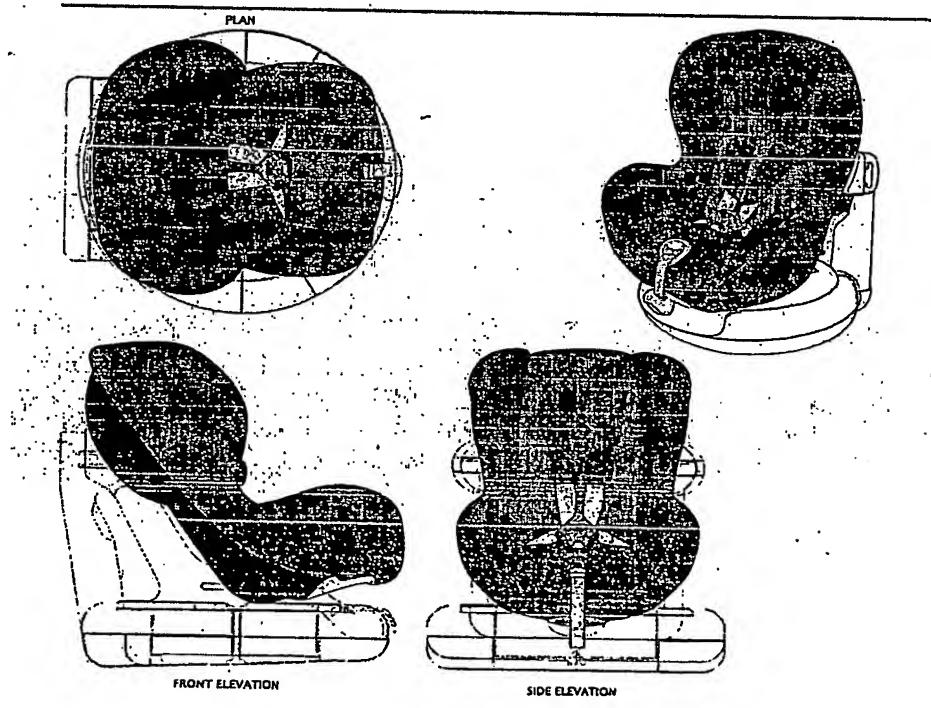


Fig 2

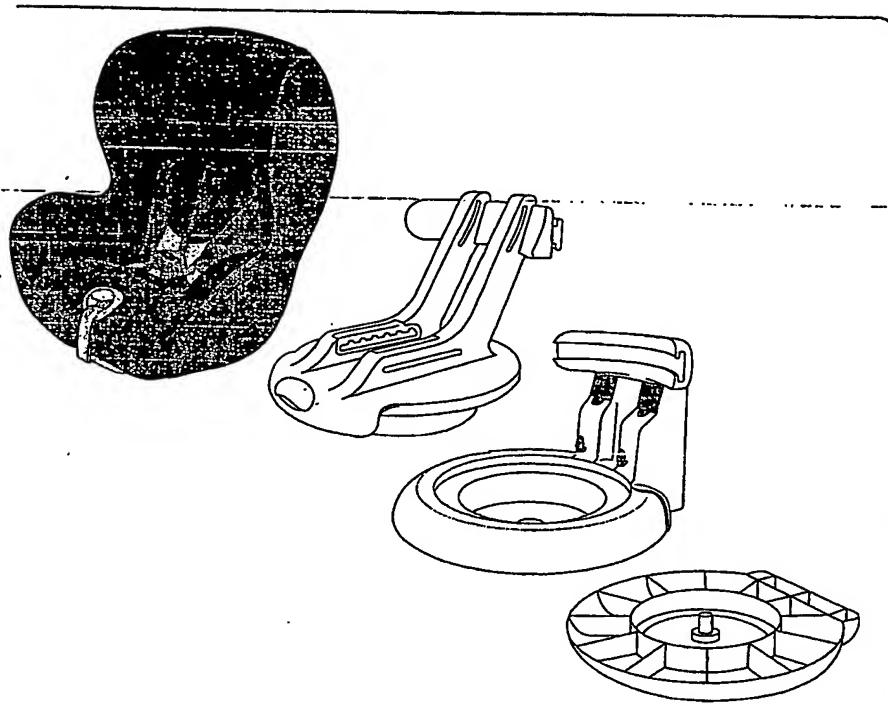


Fig 3

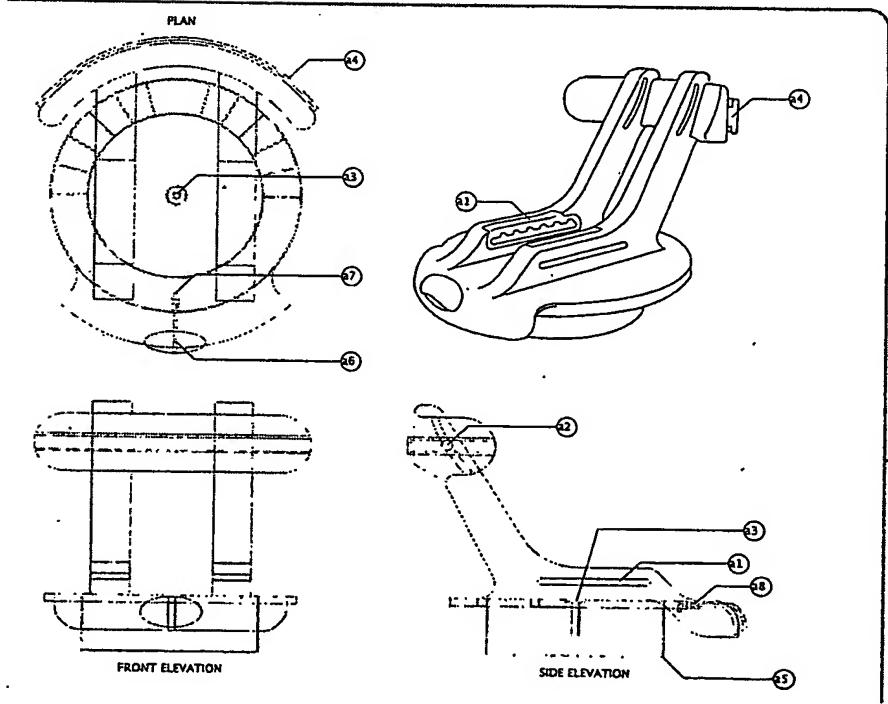


Fig 4a

3/

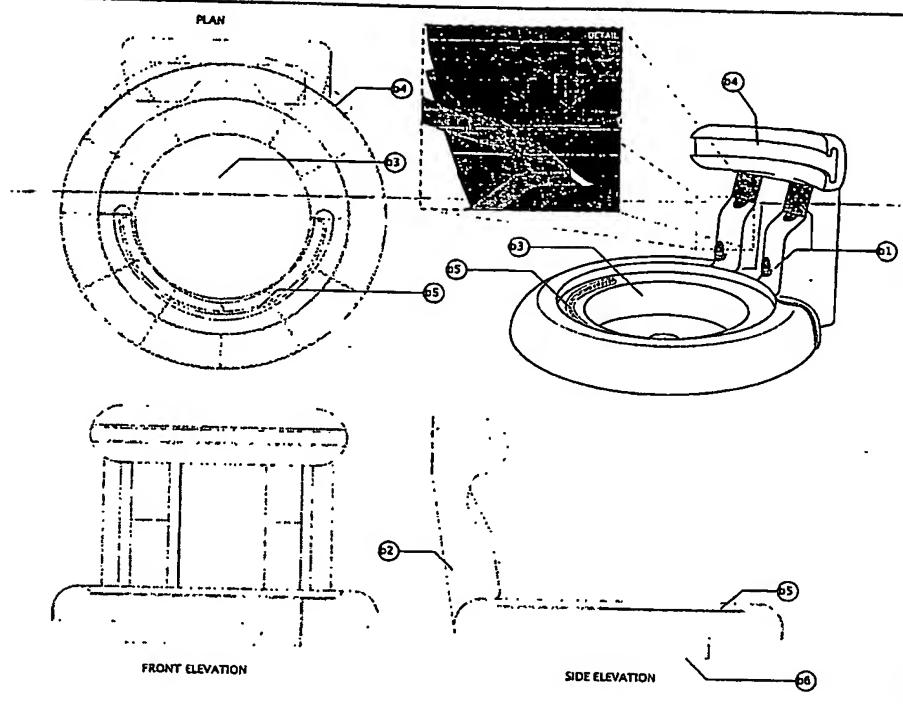


Fig 4b

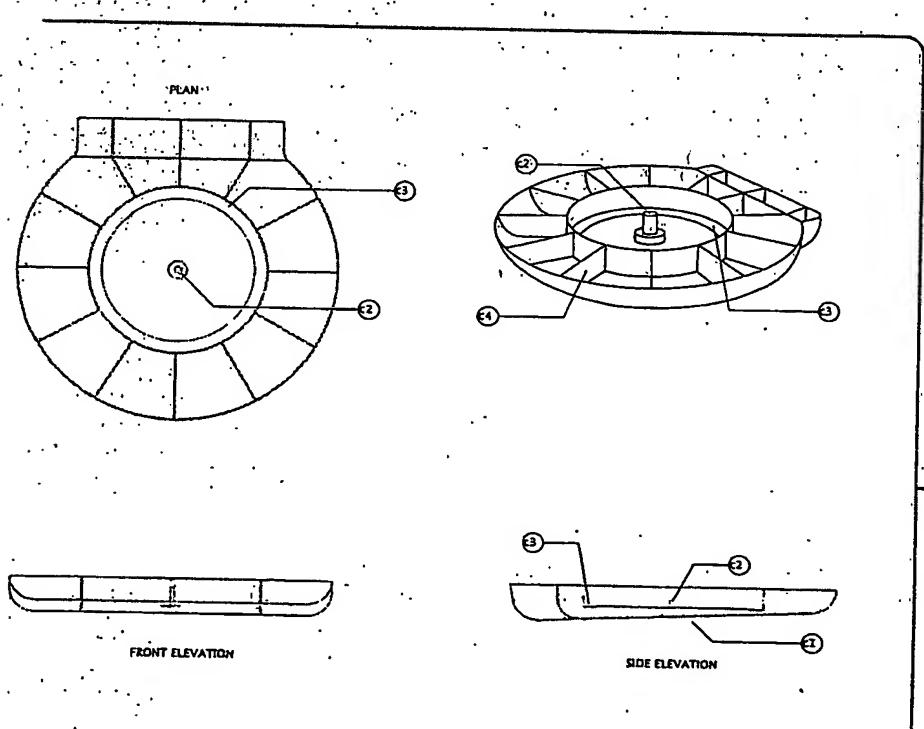


Fig 4c

41

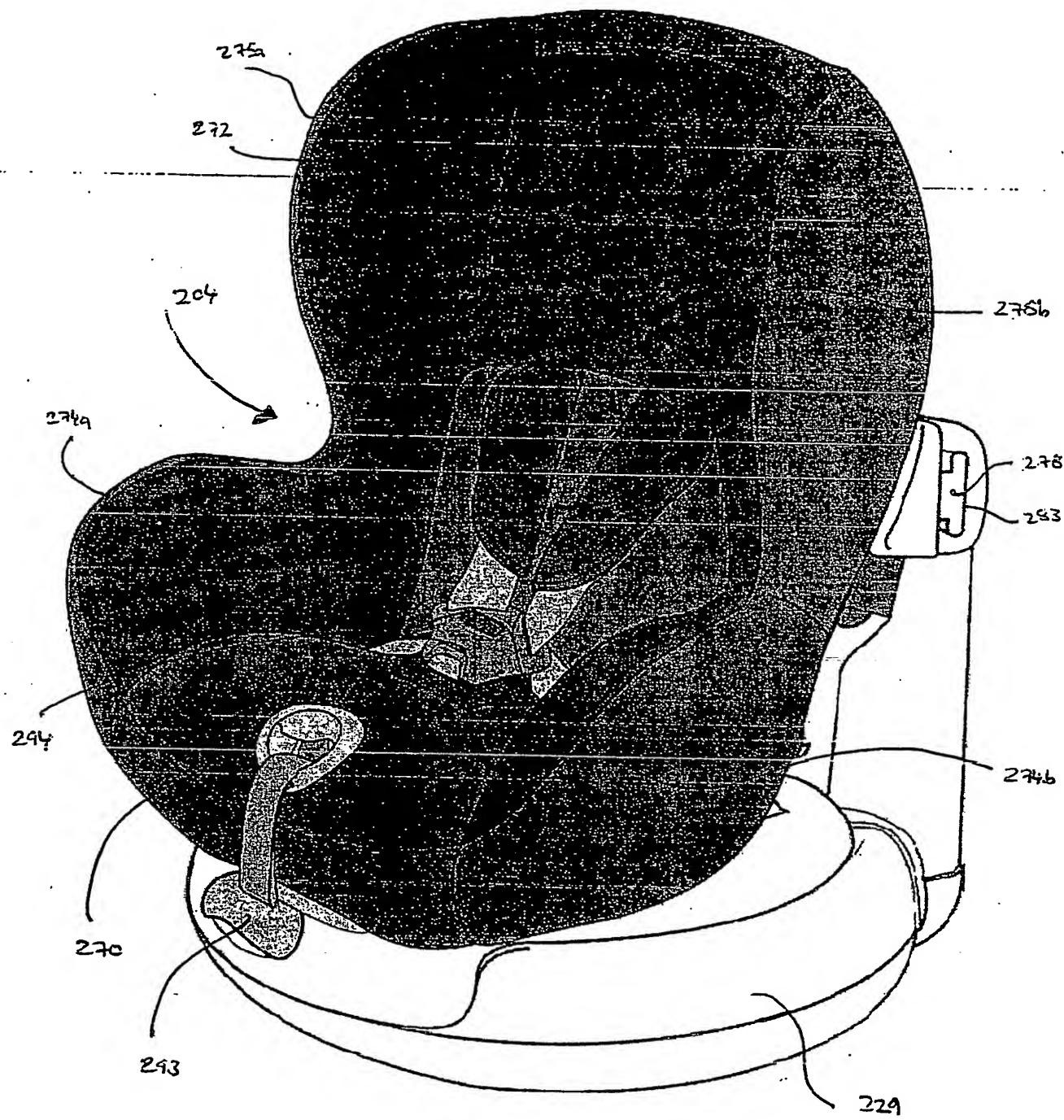


Fig 8

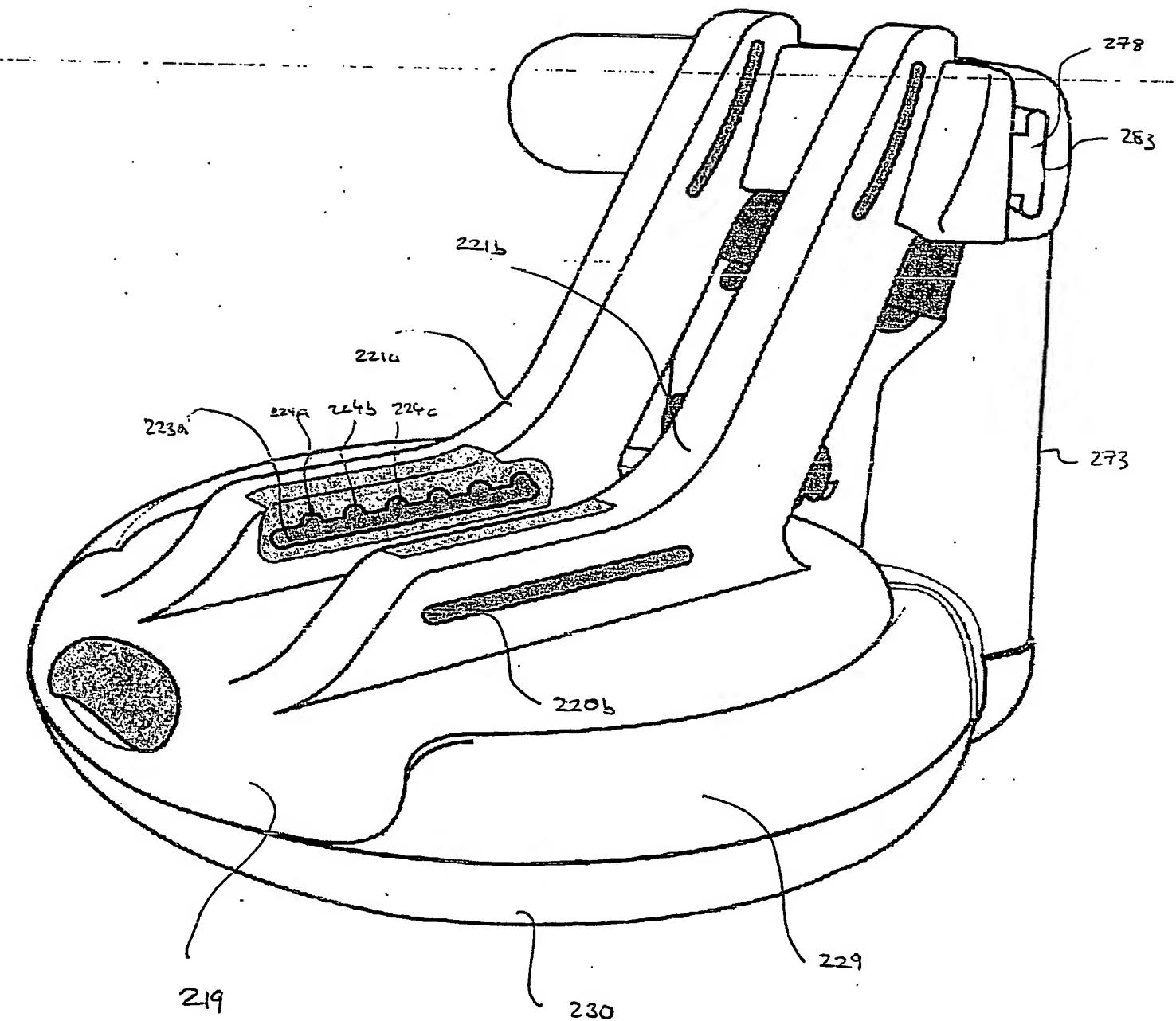


Fig 9

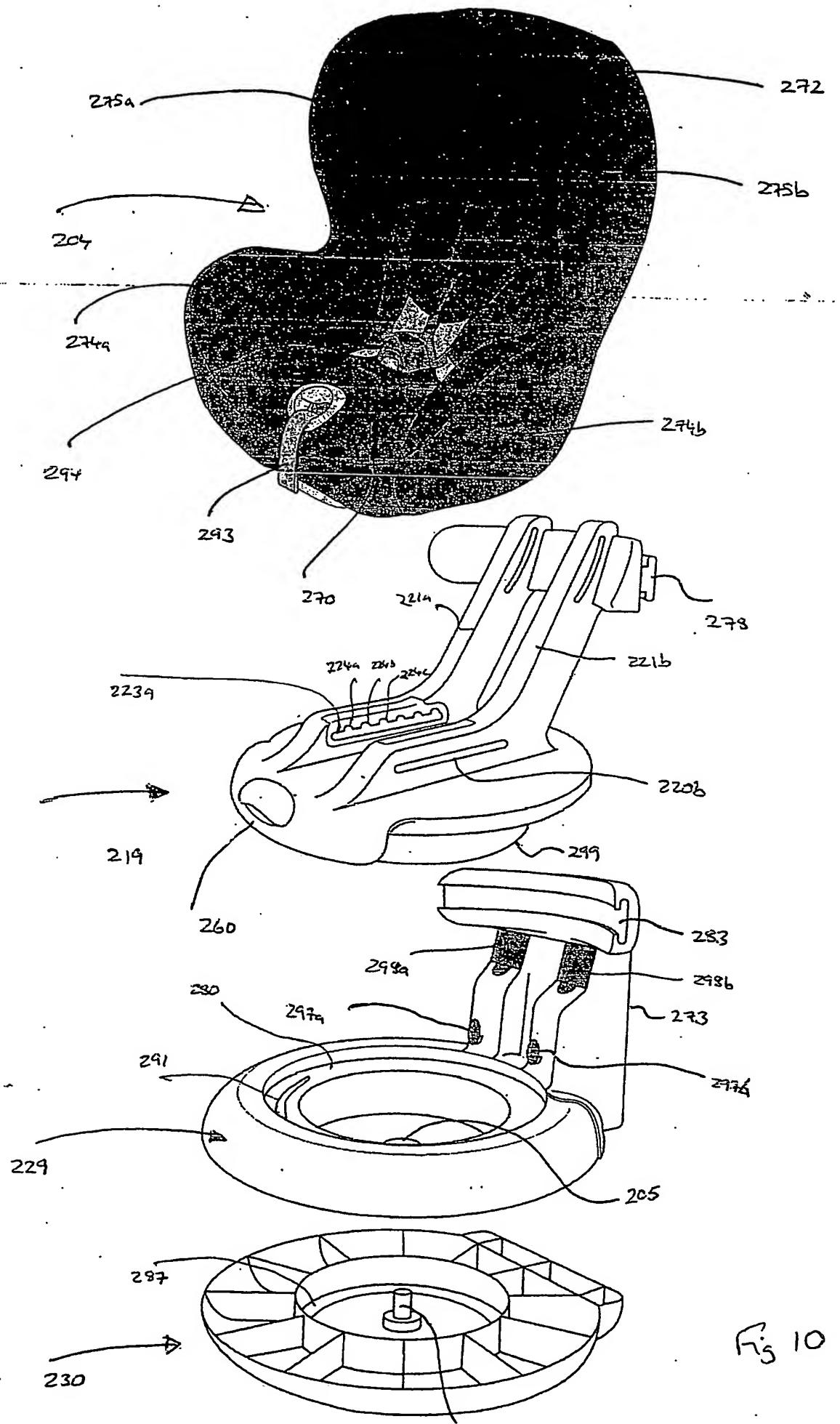


Fig 10

71

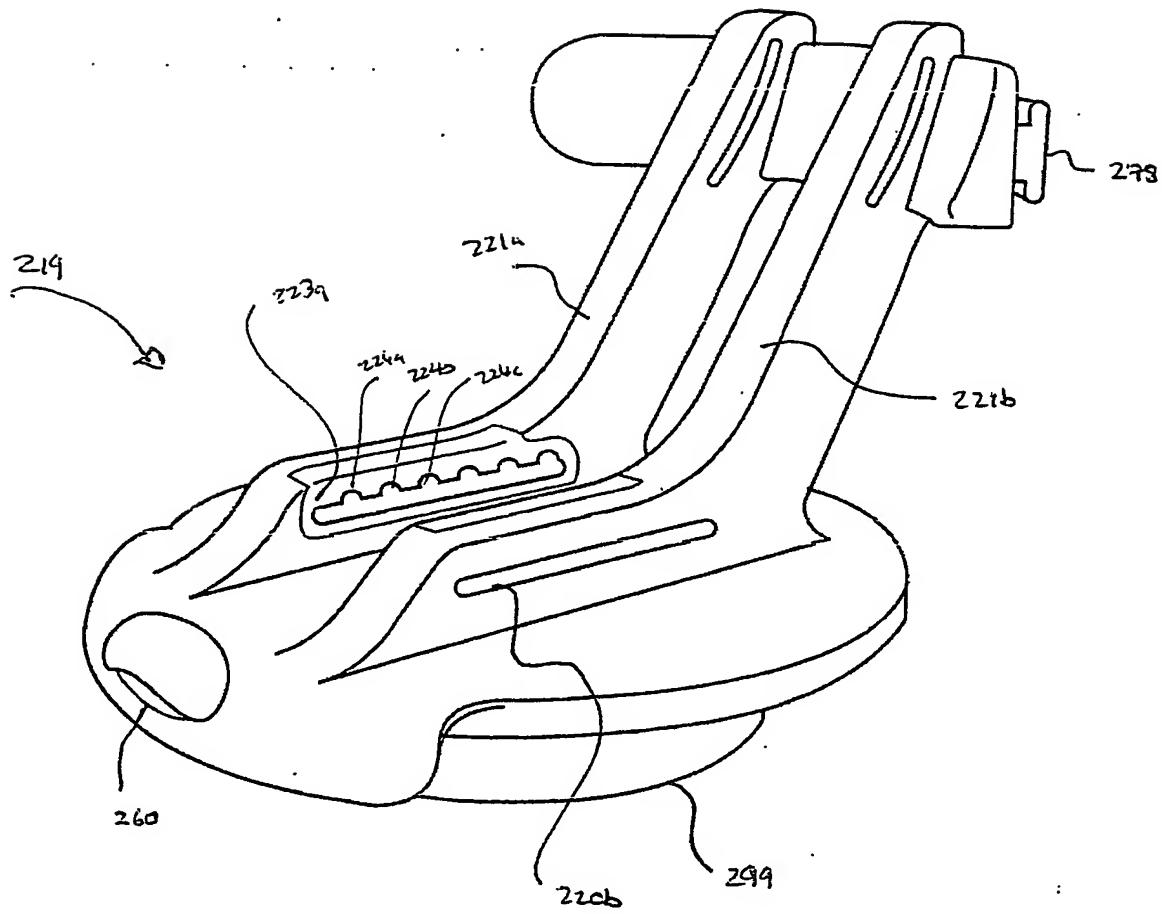


Fig 11

8 /

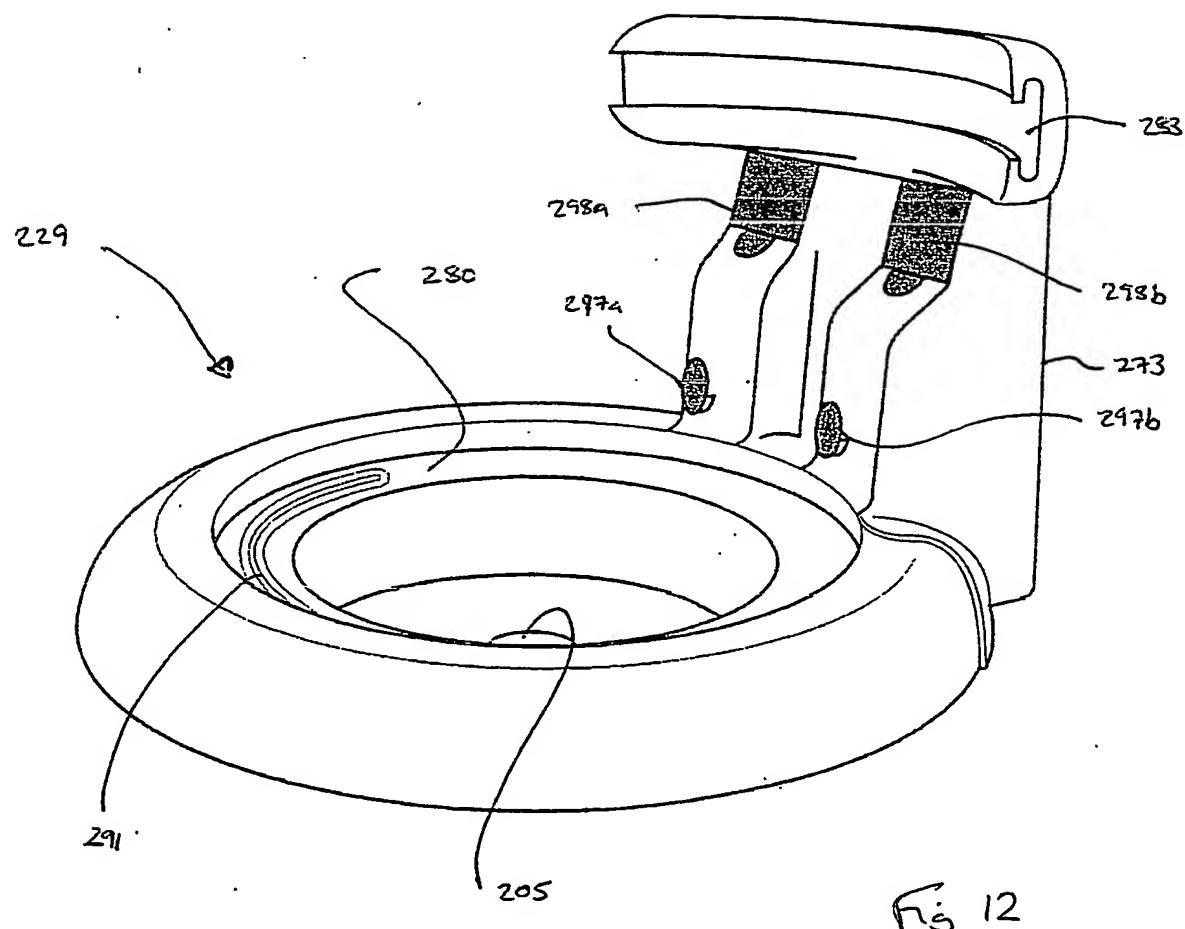


Fig 12

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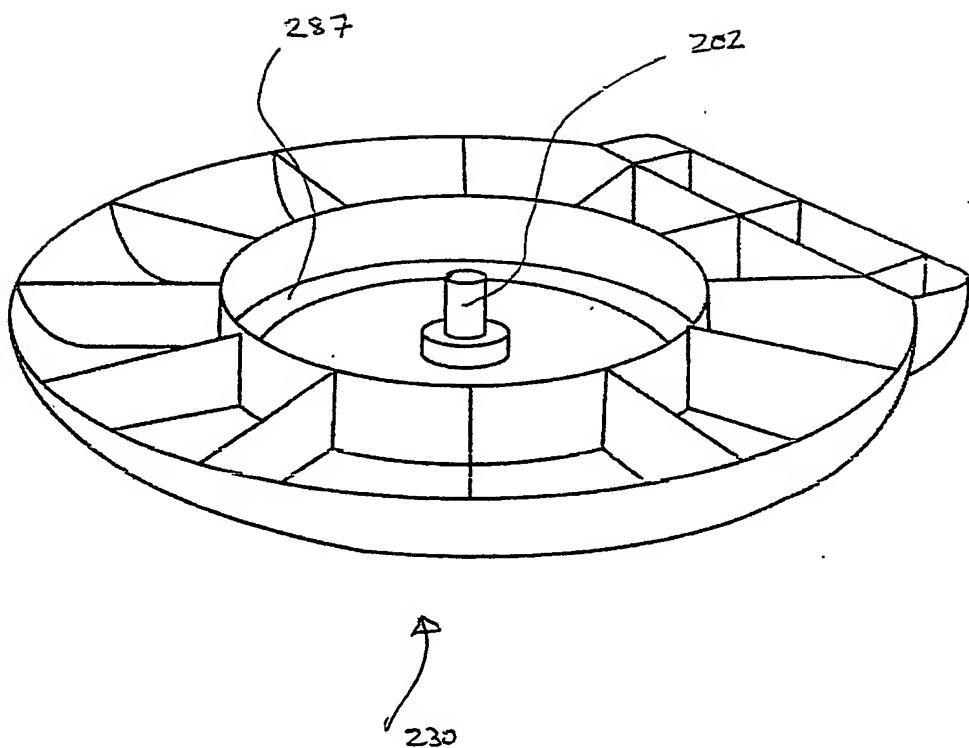


Fig 13

*3*  
**PCT/EP2004/006775**



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